

**DETAILED ACTION**

***Claim Status***

1. Claims 1, 3-6, 8-16, 18-19, and 21-28 are pending.

***Claim Rejections - 35 USC § 101***

2. Regarding claim 15, this claim recites a “computer-readable storage medium”. In the absence of any other modifying disclosure of this limitation in the specification, the ‘computer-readable storage medium’ is limited to statutory embodiments only such that it satisfies the terms of 35 U.S.C. 101.

3. Regarding claims 16, 18-19, and 21-28, in particular claim 16, claim 16 recites a “processor” and “memory”. In the absence of any other modifying disclosure of this limitation in the specification, the terms ‘processor’ and ‘memory’ are limited to statutory embodiments only such that it satisfies the terms of 35 U.S.C. 101.

***Supplemental Examiner’s Amendment***

4. An examiner’s amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

5. Authorization for an examiner's amendment was given in a telephone interview with Mr. Joseph F. Key (reg. 44,827) on March 8, 2010.

**In the specification:**

**Please Amend Page 23 paragraph 1 as below:**

Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more processors of any kind of digital computer. Generally, a processor will receive instructions and data from a read-only memory or a random access memory or both. The essential elements of a computer are at least one processor for executing instructions and one or more memory devices for storing instructions and data. Generally, a computer will also include, or be operatively coupled to receive data from or transfer data to, or both, one or more mass storage devices for storing data, e.g., magnetic, magneto-optical disks, or optical disks. Information carriers suitable for embodying computer program instructions and data include all forms of non-volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto-optical disks; and CD-ROM and DVD-ROM disks. Also, computer-readable storage mediums suitable for storing computer program instructions and data include all forms of non-volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto-optical disks; and CD-ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in special purpose logic circuitry.

4. **In the claims:**

**Please replace all prior claims with the claims below.**

1. (Previously presented) A computer implemented method for logically evaluating a Boolean expression used in a query statement, wherein the Boolean expression refers to an attribute and includes a plurality of conditions, the method comprising:
- receiving the Boolean expression;
  - decomposing the Boolean expression into the plurality of conditions;

wherein each condition of the plurality of conditions includes an attribute name, a relational operator, and at least one condition value;

for each condition of the plurality of conditions, extracting at least one condition value referring to the attribute name for a condition of the plurality of conditions, wherein the at least one condition value defines a value range of the condition of the plurality of conditions;

inserting the at least one condition value in a condition value list in sorted order;

initializing, by a computer, a relationship vector for the at least one condition value, wherein each relationship vector component in the relationship vector is a relational operator counter and initializing the relationship vector comprises setting the relational operator counter for each of the relationship vector components to an initial value; and

adjusting the relationship vectors for the at least one condition value and for each further condition value that is in the condition list that is in the value range of the condition of the at least one condition value by adjusting the relational operator counters, wherein adjusting the relationship vectors comprises:

incrementing at least one of the relationship vector components for the at least one condition value by an increment to reflect the condition, and

propagating the increment through each of the relationship vector components for each further condition value in the condition list as long as the further condition value is within the value range of the condition; and

reducing the Boolean expression according to each relationship vector.

2. (cancelled).

3. (Previously presented) The method of claim 1, wherein extracting the at least one condition value referring to the attribute name for the condition of the plurality of conditions comprises:  
retrieving a maximum condition value or a minimum condition value of the condition.

4. (Previously presented) The method of claim 1, wherein extracting the at least one condition value referring to the attribute name for the condition of the plurality of conditions comprises:  
retrieving an identity condition value of the condition.

5. (Previously presented) The method of claim 1, wherein initializing the relationship vector comprises:

initializing the relationship vector as including a LESS THAN component value, an EQUAL TO component value or a GREATER THAN component value.

6. (previously presented) The method of claim 5, wherein initializing the relationship vector comprises:

setting each relationship vector component for the at least one condition value to an initial value if the condition list has no further condition value;

setting each relationship vector component to the LESS THAN component value of the relationship vector for the next greater condition value in the condition value list; or

setting each relationship vector component to the GREATER THAN component value of the relationship vector for the next smaller condition value in the condition value list.

7 (Cancelled).

8. (Previously presented) The method of claim 1, wherein reducing the Boolean expression comprises:

identifying an AND-subset of condition values in the condition value list, where each subset condition value has at least one relationship vector component that has a value equal to the increment multiplied by the number of conditions in the plurality of conditions.

9. (Previously presented) The method of claim 8, wherein reducing the Boolean expression further comprises:

composing a reduced Boolean expression based on the AND-subset.

10. (Previously presented) The method of claim 1, wherein reducing the Boolean expression comprises:

identifying an OR-subset of condition values in the condition value list, where each subset condition value has at least one relationship vector component with the initial value.

11. (Previously presented) The method of claim 10, wherein reducing the Boolean expressions further comprises:

composing a reduced Boolean expression based on the OR-subset.

12. (Previously presented) The method of claim 8, further comprising: if the AND-subset is empty, sending a corresponding notification to a user.

13. (Previously presented) The method of claim 10, further comprising: if the OR-subset is empty, sending a corresponding notification to a user.

14. (Currently Amended) The method of claim [[2]]1, wherein reducing the Boolean expression comprises:

composing a reduced Boolean expression, where the reduced Boolean expression comprises a condition that merges at least a first condition and a second condition, the first and second conditions referring to the attribute and representing disjoint intervals, the attribute having no values between the inner interval boundaries of the disjoint intervals.

15. (Previously presented) A computer-readable storage medium storing a computer program product for logically evaluating a Boolean expression used in a query statement, the computer program product including executable instructions that, when executed, is configured to cause at least one processor of a computing device to:

receive the Boolean expression;

decompose the Boolean expression into the plurality of conditions,

wherein each condition of the plurality of conditions includes an attribute name, a relational operator, and at least one condition value;

for each condition of the plurality of conditions, extracting at least one condition value referring to the attribute name for a condition of the plurality of conditions, wherein the at least one condition value defines a value range of the condition of the plurality of conditions;

insert the at least one condition value in a condition value list in sorted order;

initialize a relationship vector for the at least one condition value, wherein each relationship vector component in the relationship vector is a relational operator counter and the instructions that cause the processor to initialize the relationship vector comprises instructions that cause the processor to set the relational operator counter for each of the relationship vector components to an initial value; and

adjust the relationship vectors for the at least one condition value and for each further condition value that is in the condition list that is in the value range of the condition of the at least one condition value by adjusting the relational operator counters, wherein the instructions that cause the processor to adjust the relationship vectors comprise instructions that cause the processor to:

increment at least one of the relationship vector components for the at least one condition value by an increment to reflect the condition, and

propagate the increment through each of the relationship vector components for each further condition value in the condition list as long as the further condition value is within the value range of the condition; and

reduce the Boolean expression according to each relationship vector.

16. (Previously presented) A computer system for logically evaluating a Boolean expression used in a query statement, wherein the Boolean expressions refers to an attribute and includes a plurality of conditions, comprising:

a memory to receive the Boolean expression and to store a condition value list; and  
having at least one processor for executing computer program instructions to:

decompose the Boolean expression into the plurality of conditions,

wherein each condition of the plurality of conditions includes an attribute name, a relational operator, and at least one condition value;

for each condition of the plurality, extract at least one condition value referring to the attribute name for a condition of the plurality of conditions, wherein the at least one condition value defines a value range of the condition of the plurality of conditions;

insert the at least one condition value in the condition value list in sorted order;

initialize a relationship vector for the at least one condition value, wherein each relationship vector component in the relationship vector is a relational operator counter and the instructions that cause the processor to initialize the relationship vector comprises instructions that cause the processor to set the relational operator counter for each of the relationship vector components to an initial value; and

adjust the relationship vectors for the at least one condition value and for each further condition value that is in the condition list that is in the value range of the condition of the at least one condition value by adjusting the relational operator counters, wherein the computer



program instructions causing the at least one processor to adjust the relationship vectors comprise:

a first portion to increment at least one of the relationship vector components for the at least one condition value by an increment to reflect the condition, and

a second portion to propagate the increment through each of the relationship vector components for each further condition value in the condition list as long as the further condition value is within the value range of the condition; and

wherein the at least one processor further executes computer program instructions to reduce the Boolean expression according to each relationship vector.

17. (cancelled)

18. (Previously presented) The computer system of claim 16, wherein the relationship vector comprises a LESS THAN component value, an EQUAL TO component value, and a GREATER THAN component value.

19. (previously presented) The computer system of claim 18, wherein the computer program instructions causing the at least one processor to initialize comprise:

a first portion to set each relationship vector component for the at least one condition value to an initial value if the condition list has no further condition value; and

a second portion to set each relationship vector component to the LESS THAN component value of the relationship vector for the next greater condition value in the condition

value list, or to set each relationship vector component to the GREATER THAN component value of the relationship vector for the next smaller condition value in the condition value list.

20. (cancelled)

21. (Previously presented) The computer system of claim 16, wherein the memory stores an AND-subset of condition values in the condition value list, where each subset condition value has at least one relationship vector component that has a value equal to the increment multiplied by the number of conditions in the plurality of conditions.

22. (Previously presented) The computer system of claim 21, wherein the at least one processor executes further computer program instructions to compose a reduced Boolean expression based on the AND-subset.

23. (Previously presented) The computer system of claim 16, wherein the memory stores an OR-subset of condition values in the condition value list, where each subset condition value has at least one relationship vector component with the initial value.

24. (Previously presented) The computer system of claim 16, wherein the memory stores an OR-subset of condition values in the condition value list, where each subset condition value has at least one relationship vector component with a value greater than the initial value.

25. (Previously presented) The computer system of claim 23, wherein the at least one processor executes further computer program instructions to compose a reduced Boolean expression based on the OR-subset.

26. (Previously presented) The computer system of claim 21, where the at least one processor executes further computer program instructions to send a corresponding notification to a user, if the AND-subset is empty.

27. (Previously presented) The computer system of claim 23, where the at least one processor executes further computer program instructions to send a corresponding notification to a user, if the OR-subset is empty.

28. (Previously presented) The computer system of claim 22, where the memory stores a list of all values of the attribute name; and the at least one processor executes further computer program instructions to merge at least a first condition and a second condition, the first and second conditions referring to the attribute name and representing disjoint intervals, the attribute name having no values between the inner interval boundaries of disjoint intervals.

29. (Cancelled).

5. Claims 1, 3-6, 8-16, 18-19, and 21-28 are allowed.

6.. The following is a statement of reasons for the indication of allowable subject matter.

With respect to the independent claims, the prior art of record, single or in combination, does not teach or fairly suggest the steps of:

“for each condition of the plurality of conditions, extracting at least one condition value referring to the attribute name for a condition of the plurality of conditions, wherein the at least one condition value defines a value range of the condition of the plurality of conditions;

inserting the at least one condition value in a condition value list in sorted order;

initializing a relationship vector for the at least one condition value, wherein each relationship vector component in the relationship vector is a relational operator counter and initializing the relationship vector comprises setting the relational operator counter for each of the relationship vector components to an initial value; and

adjusting the relationship vectors for the at least one condition value and for each further condition value that is in the condition list that is in the value range of the condition of the at least one condition value by adjusting the relational operator counters, wherein adjusting the relationship vectors comprises:

incrementing at least one of the relationship vector components for the at least one condition value by an increment to reflect the condition, and

propagating the increment through each of the relationship vector components for each further condition value in the condition list as long as the further condition value is within the value range of the condition; and

reducing the Boolean expression according to each relationship vector.”, in combination with the other claimed limitations. Independent claims 15 and 16 recite similar limitations and are therefore allowed. Dependent claims are allowed for being dependent to an allowed claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

#### ***Contact Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL PHAM whose telephone number is (571)272-3924. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cottingham can be reached on 571-272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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